

In re: Arrowood et al.
 Serial No.: 09/693,663
 Filed: October 20, 2000
 Page 2 of 13

In the Claims:

Listing of Claims

1. (Currently Amended) A method of distributing workload between data processing systems executing an application which communicates over a network, the method comprising:

- receiving a request for a connection to the application over the network;
- obtaining workload information for the data processing systems;
- obtaining network quality of service information associated with communications over the network for respective ones of the data processing systems;
- generating workload metrics associated with respective ones of the data processing systems utilizing the workload information and the corresponding network quality of service information for the data processing systems; and
- distributing the requested connection to instances of the application executing on the data processing systems based on the generated workload metrics;

wherein the workload information comprises a weight value (W) corresponding to a data processing systems processing capacity;

wherein the network quality of service information comprises a loss weight (F-loss) based on packet loss ratio, a network timeout weight (F-timeout) based on a network timeout ratio and a connection weight (F-con) based on a number of active connections;

determining a value for F-loss by mapping a TCP loss ratio to the value for F-loss;

determining a value for F-timeout by mapping a timeout loss ratio to the value for F-timeout;

determining a value for F-con by determining if a number of current connections exceed a predefined percentage of a total number of allowed connections and setting F-con to 1 if the total number of connections exceeds the predefined percentage of the total number of allowed connections and to 0 if the total number of connections does not exceed the predefined percentage of the total number of allowed connections; and

wherein generating workload metrics comprises evaluating the equation:

$$Aw = (1 - \text{MIN}(1, F\text{-loss} + F\text{-timeout} + F\text{-con})) * W$$

where Aw is the workload metric.

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 3 of 13

2-7. Cancelled.

8. (Original) A method according to Claim 1, wherein the quality of service information comprises quality of service information for an instance of the application executing on one of the data processing systems.

9. (Original) A method according to Claim 1, wherein the quality of service information is divided into classes of quality of service information associated with the application based on a common constraint, the method further comprising the step of:

determining a class of quality of service information associated with the connection request; and

wherein the step of obtaining network quality of service information associated with communications over the network for the data processing systems comprises obtaining network quality of service information for the class of quality of service information associated with the connection request.

10. (Original) A method according to Claim 9, wherein the step of generating workload metrics comprises the step of combining the workload information and the corresponding network quality of service information for the data processing systems based on the class of quality of service information associated with the request so as to provide workload metrics based on the workload information, the quality of service information and the class of quality of service information associated with the request.

11. (Original) A method according to Claim 1, wherein the data processing systems comprise data processing systems in a Sysplex, wherein the steps of receiving a request for a connection to the application over the network, obtaining workload information for the data processing systems, obtaining network quality of service information associated with communications over the network for the data processing systems, generating workload metrics and distributing the requested connection to application instances on the data processing systems

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 4 of 13

based on the workload metric are carried out by a routing communication protocol stack in the Sysplex.

12. (Original) A method according to Claim 11 wherein the routing communication protocol stack obtains the quality of service information from policy agents executing on the data processing systems in the Sysplex.

13. (Currently Amended) A system for workload distribution, comprising:
a workload distributor which selects data processing systems in a cluster of data processing systems for distribution of connections based on network quality of service information associated with the data processing systems and workload information associated with the data processing systems; and

a router operably associated with the workload distributor which receives requests for connection to an application executing on ones of the data processing systems and distributes the connections to data processing systems in the cluster of data processing systems selected by the workload distributor;

wherein the network quality of service information comprises a loss weight (F-loss) based on packet loss ratio, a network timeout weight (F-timeout) based on a network timeout ratio and a connection weight (F-con) based on a number of active connections;

wherein F-loss is determined by mapping a TCP loss ratio to the value for F-loss, F-timeout is determined by mapping a timeout loss ratio to the value for F-timeout and F-con has a value of 1 if a total number of connections to the application associated with the connection request exceeds a predefined percentage of the total number of allowed connections and to 0 if the total number of connections does not exceed the predefined percentage of the total number of allowed connections;

wherein the workload distributor is configured to evaluate the equation:

$$Aw = (1 - \text{MIN}(1, F\text{-loss} + F\text{-timcout} + F\text{-con})) * W$$

where Aw is a workload metric and W is the workload information; and

wherein the workload distributor selects a data processing system with a best Aw value.

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 5 of 13

14. (Original) A system according to Claim 13, wherein the router comprises a routing communication protocol stack.

15. (Original) A system according to Claim 14, wherein the requests for connections to the application comprise requests for connections to a dynamically routable virtual Internet Protocol address.

16. (Original) A system according to Claim 13, further comprising policy agents associated with the data processing systems which provide quality of service information to the workload distributor.

17-20. Cancelled.

21. (Currently Amended) A system for distributing workload between data processing systems executing an application which communicates over a network, comprising:
means for receiving a request for a connection to the application over the network;
means for obtaining workload information for the data processing systems;
means for obtaining network quality of service information associated with communications over the network for respective ones of the data processing systems;
means for generating workload metrics associated with respective ones of the data processing systems utilizing the workload information and the corresponding network quality of service information for the data processing systems; and
means for distributing the requested connection to instances of the application executing on the data processing systems based on the generated workload metrics;
wherein the workload information comprises a weight value (W) corresponding to a data processing systems processing capacity;
wherein the network quality of service information comprises a loss weight (F-loss) based on packet loss ratio, a network timeout weight (F-timeout) based on a network timeout ratio and a connection weight (F-con) based on a number of active connections;

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 6 of 13

means for determining a value for F-loss by mapping a TCP loss ratio to the value for F-loss;

means for determining a value for F-timeout by mapping a timeout loss ratio to the value for F-timeout;

means for determining a value for F-conn by determining if a number of current connections exceed a predefined percentage of a total number of allowed connections and setting F-con to 1 if the total number of connections exceeds the predefined percentage of the total number of allowed connections and to 0 if the total number of connections does not exceed the predefined percentage of the total number of allowed connections; and

wherein the means for generating workload metrics comprises means for evaluating the equation:

$$Aw = (1 - \text{MIN}(1, F\text{-loss} + F\text{-timeout} + F\text{-con})) * W$$

where Aw is the workload metric.

22.-27. Cancelled.

28. (Original) A system according to Claim 21, wherein the quality of service information comprises quality of service information for an instance of the application executing on one of the data processing systems.

29. (Original) A system according to Claim 21, wherein the quality of service information is divided into classes of quality of service information associated with the application based on a common constraint, further comprising:

means for determining a class of quality of service information associated with the connection request; and

wherein the means for obtaining network quality of service information associated with communications over the network for the data processing systems comprises means for obtaining network quality of service information for the class of quality of service information associated with the connection request.

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 7 of 13

30. (Original) A system according to Claim 29, wherein the means for generating workload metrics comprises means for combining the workload information and the corresponding network quality of service information for the data processing systems based on the class of quality of service information associated with the request so as to provide workload metrics based on the workload information, the quality of service information and the class of quality of service information associated with the request.

31. (Currently Amended) A computer program product for distributing workload between data processing systems executing an application which communicates over a network, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

computer readable program code which receives a request for a connection to the application over the network;

computer readable program code which obtains workload information for the data processing systems;

computer readable program code which obtains network quality of service information associated with communications over the network for respective ones of the data processing systems;

computer readable program code which generates workload metrics associated with respective ones of the data processing systems utilizing the workload information and the corresponding network quality of service information for the data processing systems; and

computer readable program code which distributes the requested connection to instances of the application executing on the data processing systems based on the generated workload metrics;

wherein the workload information comprises a weight value (W) corresponding to a data processing systems processing capacity;

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 8 of 13

wherein the network quality of service information comprises a loss weight (F-loss) based on packet loss ratio, a network timeout weight (F-timeout) based on a network timeout ratio and a connection weight (F-con) based on a number of active connections;

computer readable program code which determines a value for F-loss by mapping a TCP loss ratio to the value for F-loss;

computer readable program code which determines a value for F-timeout by mapping a timeout loss ratio to the value for F-timeout; and

computer readable program code which determines a value for F-con by determining if a number of current connections exceed a predefined percentage of a total number of allowed connections and setting F-con to 1 if the total number of connections exceeds the predefined percentage of the total number of allowed connections and to 0 if the total number of connections does not exceed the predefined percentage of the total number of allowed connections; and

wherein the computer readable program code which generates workload metrics comprises computer readable program code which evaluates the equation:

$$Aw = (1 - \text{MDN}(1, F\text{-loss} + F\text{-timeout} + F\text{-con})) * W$$

where Aw is the workload metric.

32.-37. Cancelled.

38. (Original) A computer program product according to Claim 31, wherein the quality of service information comprises quality of service information for an instance of the application executing on one of the data processing systems.

39. (Original) A computer program product according to Claim 31, wherein the quality of service information is divided into classes of quality of service information associated with the application based on a common constraint, further comprising:

computer readable program code which determines a class of quality of service information associated with the connection request; and

wherein the computer readable program code which obtains network quality of service information associated with communications over the network for the data processing systems

In re: Arrowood et al.
Serial No.: 09/693,663
Filed: October 20, 2000
Page 9 of 13

comprises computer readable program code which obtains network quality of service information for the class of quality of service information associated with the connection request.

40. (Original) A computer program product according to Claim 39, wherein the computer readable program code which generates workload metrics comprises computer readable program code which combines the workload information and the corresponding network quality of service information for the data processing systems based on the class of quality of service information associated with the request so as to provide workload metrics based on the workload information, the quality of service information and the class of quality of service information associated with the request.